

Speed and Direction Control of DC Motor using Android Mobile Application

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Abstract: The electric drive systems used in industrial applications are increasingly required to meet higher performance and reliability requirements. The DC motor is an attractive piece of equipment in many industrial applications requiring variable speed and load characteristics due to its ease of controllability. Microcontrollers provide a suitable means of meeting these needs. Certainly, part of the recent activity on microcontrollers can be ascribed to their newness and challenge. In this paper, implementation of the MC68HC11E9 microcontroller for speed control of DC motor fed by a DC chopper has been investigated. The chopper is driven by a high frequency PWM signal. Controlling the PWM duty cycle is equivalent to controlling the motor terminal voltage, which in turn adjusts directly the motor speed. Experimental results have been obtained that show the employment of microcontroller for speed control and over current protection of a DC motor.

Keywords: ARDUINO, Android mobile, DC Motor, Bluetooth Module.

I. INTRODUCTION

This system DC motor Controller by Android is developed to control the speed of the DC motor in both clockwise and anticlockwise direction. For this DC motor is interfaced to the 8051 microcontroller. A Bluetooth modem is used to receive direction commands and PWM commands. When an Android device sends commands, it is received by the Bluetooth modem which then sends the commands to the microcontroller. The microcontroller the controls the DC motor through motor driver. The entire system is powered by 12V transformer. LCD display is used to show the status and the speed of the DC motor. The android application is used to control the entire system. The start button is first clicked to start the motor and then the motor can run in both clockwise and anticlockwise direction. Simultaneously the status of the system is displayed on the LCD screen and also the speed of the DC motor is displayed on the screen. Thus the speed of the motor can be increased or decreased in clockwise or anticlockwise direction with the help of this android application.

The major elements of block diagram are:

- Arduino UNO
- Bluetooth Module
- DC motor

Arduino UNO:

The Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs,

a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. The ATmega328 on the Uno comes preprogrammed with a boot loader that allows you to upload new code to it without the use of an external hardware programmer.

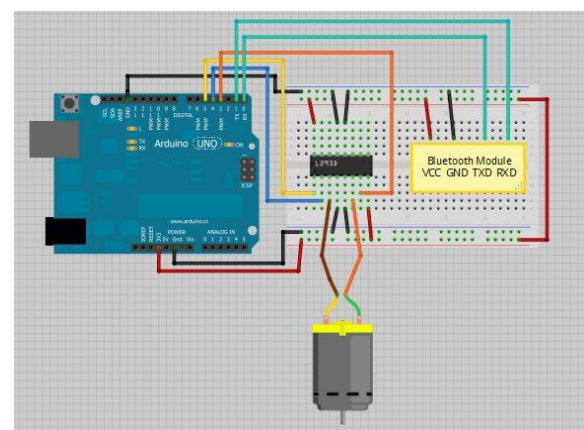
Bluetooth Module:

Bluetooth serial communication module has two work modes: order-response work mode and automatic connection work mode. And there are three work roles at the automatic connection work mode. When the module is at the automatic connection work mode, it will follow the default way set lastly to transmit the data automatically. When the module is at the orderresponse work mode, user can send the AT command to the module to set the control parameters and sent control order. The work mode of this Module can be switched by controlling the module PIN (PIO11) input level. In this project Bluetooth module is used to send signals from the ARDUINO UNO.

DC Motor:

Almost every mechanical movement that we see around us is accomplished by an electric motor. Electrical machines are used for the converting energy. Motors take electrical energy and produce mechanical energy. Electric motor is used to power hundreds of devices we use in everyday life. An example of small motor applications includes motors used in automobiles, robot, hand power tools and food blenders.

II. SYSTEM CIRCUIT



III. ANDROID STUDIO

Android Studio is a free integrated development environment (IDE) from Google and official development environment for Android. Android Studio is based on Intelligent IDEA. In addition to the features

that are already implemented in IntelliJ IDEA, furthermore, the following functions are available: Support for the development of Android, Android Wear and Android TV Apps .Android Studio uses a build management automation tool, the on Gradle is based. The system gives the developer the opportunity for different device types such. B. Tablets to create optimized versions of the app. Theme editor Android Lint It is possible to configure Google services like Google Cloud Messaging within the IDE and apply it directly to the app. Support for ProGuard and automatic app signing The source code of Android Studio is freely available.

IV. WORKING

Signal from Android device will be sent through Bluetooth. This signal will be communicated with arduino with the help of transmitter and receiver of both the devices. This signal will be represented by a single letter which denotes the speed and direction of the motor. There are three different direction of rotation: clockwise, anti-clockwise and stopping of the motor and these will be represented by different letters. This letter will vary the speed with reference to the arduino code. For forward direction the transistor Q1 and Q4 will be ON and for the reverse direction Q2 and Q3 will ON. Q1 and Q2 are PNP transistors which becomes ON when low signal is sent and Q3 and Q4 are NPN transistors which becomes ON when high signal. PWM pins 5 and 6 are used to control the speed of the in both directions, they use the concept of varying the dutycycle (PWM Technique). Dutycycle varies from 0 - 225. So by choosing different duty cycle speed can be varied. Direction is controlled with the concept of having H-Bridge.

V. ADVANTAGES

- Bluetooth consumes less power than other devices.
- Android application is user-friendly.
- Technically expert persons are not required.
- Wireless communication is enhanced.
- Programming is simpler.

VI. DISADVANTAGES

- Usage of Bluetooth module makes the usage only within a short range.
- Usage of android app in smart phones consumes battery.

VII. APPLICATION

- Home automation.
- Many industrial applications require adjustable speed drive and constant speed for improving the quality product.
- Intensity of light can also be controlled with the help of android app.

VIII. CONCLUS ION

Thus the speed and direction control of the DC motor is achieved with the help of Android mobile application with the help of Bluetooth technology. In this way wireless communication is also achieved.

IX. FUTURE SCOPE

- In future, apart from controlling the speed and direction of DC motors, the same technique can be implemented in both single phase and three phase AC motors as well.
- For long range wireless communication WIFI-module can be used.
- Touch screen technology can also be implemented.

X. REFERENCE

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